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A group of 19 subjects was exposed to a verbal passage for learning that contained associatively related words, while a second group of 19 subjects was exposed to the identical passage but with high association (HA) words replaced by low association (LA) words. A written prompted recall test followed presentation. Group HA had as prompts all of the HA words, while Group LA had all of the LA words. The study was concerned with whether the observed superiority in the recall of content context words (CCWs) from HA passages is a storage or a retrieval phenomenon. Since it has been observed that HA words are recalled better than LA words, it was necessary in the present study to equate the groups on the number of prompt words available during recall. Significantly more CCWs and significantly more prompt words appeared on the recall sheets of the HA subjects. However, there was some evidence that for some clusters of prompt words, proportionally more CCWs were recalled by HA subjects than by LA subjects. (Author/DO)

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THE SOURCE OF FACILITATION IN THE RECALL OF CONTEXT WORDS THAT ACCOMPANY ASSOCIATIVELY RELATED WORDS IN CONNECTED DISCOURSE[1]

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1 group of 19 subjects was exposed to a verbal passage for learning that contained associatively related words, while a second group of 19 subjects was exposed to the identical passage but with the high association (HA) words replaced by low association (LA) words. A written prompted recall test followed presentation. Group HA had as prompts all of the HA words, while Group LA had all of the LA words. The study was concerned with whether the observed superiority in the recall of content context words (CCWs) from HA passages is a storage or a retrieval phenomenon. Since it has been observed that HA words are recalled better than LA words, it was necessary in the present study to equate the groups on the number of prompt words available during recall. Significantly more CCWs and significantly more prompt words appeared on the recall sheets of the HA subjects. However, there was some evidence that for some clusters of prompt words, proportionally more CCWs were recalled by HA subjects than by LA subjects.

In a series of studies, the investigator (1968a) has shown that associatively related (free association norms) words embedded in the same or in adjacent sentences in connected discourse are recalled better than associatively unrelated words embedded in the same manner in connected discourse. An incidental but interesting finding in the studies was that context content words (CCWs) were recalled better when they were accompanied by high association (HA) items than when they were accompanied by low association (LA) items. In a typical study, the HA and LA passages contained the same context materials.

One possible explanation of the results for CCWs is that the presence of HA items in a passage makes the passage a more integrated unit, the result of which would be the establishment of stronger associations between CCWs and HA items. A simpler explanation, however, is that since more HA words are recalled than LA words, HA subjects have more cues available to them during the test of recall than LA subjects for the recall of CCWs. According to the first of these explanations, the superior recall of CCWs from HA passages is due to more efficient storage, while the second explanation places the emphasis upon a variable that operates during retrieval.

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The present study was designed to evaluate the alternative explanations by equating HA and LA subjects on the number of cues available for use in the retrieval of CCWs during recall. If the first hypothesis is correct, superior recall of CCWs by HA subjects under such conditions would be expected. If the second hypothesis is correct, the difference between HA and LA subjects in the recall of CCWs should disappear.

Method

Subjects. The subjects were 38 paid undergraduate volunteers from introductory psychology courses who were randomly assigned to two groups of 19 subjects each. Groups of 2 to 9 subjects were tested.

Material. The learning materials were two 333-word prose passages that were used in a recent study by the investigator (1968b). The HA passage contained 56 key items (14 groups of 4 associatively related nouns selected from free association norms), as did the LA passage (14 groups of 4 associatively unrelated nouns). The contexts of the passages were identical, and the HA and LA items occupied the same positions. For example, a sentence from the HA passage was "The man walked to the corner to meet the woman who was looking at a boy and a girl across the way." Its LA counterpart was "The man walked to the corner to meet the guest who was looking at a horse and a bird across the way." In these examples, the HA items are man, woman, boy, girl, and the LA items are man, guest, horse, bird. The HA and LA items in each group of 4 were comparable in Thorndike-Lorge (1944) frequency, and in length, identical in grammatical class, and meaningful in the context of the passages. The CCWs in each passage were the adjectives, nouns, verbs and adverbs. The passages were recorded on magnetic tape at a moderate reading rate with normal intonation.

For the prompted recall task, subjects were given sheets of lined paper and a sheet on which was printed (from left to right in 5 rows) either the 56 HA nouns or the 56 LA nouns in the order in which they appeared in the passages.

Procedure. The conditions of the experiment were presented alternately in a research classroom. The presentation time for each passage was 115 sec. The interval between the end of presentation and the beginning of written recall was 4 sec. All instructions were presented orally by the experimenter prior to presentation of a passage. The subjects' task was to listen to a passage and to try to learn it verbatim. For the prompted recall task, the subjects were instructed to write down as much of a passage as they could remember, to use the printed items as prompts, and to guess at items they could not remember.

All subjects were told that the prompts were printed in the order in which they appeared in the passages. Written recall time was 12 min.

Results

The main dependent variable was the number of CCWs recalled correctly without regard for location on the recall sheets. An item that occurred more than once in a passage was counted as correct up to the total number of times it occurred in the passage. There were 80 CCWs in each passage.

Since unprompted recall of CCWs had not been determined for the passages used in the present study, the investigator's (1968b) recall data were reexamined for this variable. High association subjects recalled, on the average, 22.45 CCWs, while LA subjects recalled 18.25 CCWs. The difference was found to be significant, $t(38) = 1.94$, $p < .05$, one-tailed.

In the present study, the mean number of CCWs recalled by Group HA was 26.95, and Group LA, 18.47. The difference in favor of Group HA was found to be significant, $t(36) = 4.00$, $p < .001$, one-tailed. However, the prompted recall protocols were scored for the number of prompt words that appeared on the recall sheets, and Group HA ($\bar{x} = 45.21$) was superior to Group LA ($\bar{x} = 34.05$) on this variable as well, $t(36) = 4.21$, $p < .001$, one-tailed. Although the groups were equated on the number of prompt words available during recall, the HA subjects appeared to have utilized more of them than the LA subjects.

One possible explanation for this finding is that the LA subjects worked at a slower rate than the HA subjects and therefore, did not have enough time to utilize more of the prompt words and to record everything they remembered. If this was the case, the two groups should not differ on the utilization of prompt words from the first half of the passages, since the recall time was certainly adequate for LA subjects to utilize these items. However, an analysis of the results for the first half of the passages revealed trends that were identical to those found for the passages as a whole, viz., Group HA utilized significantly ($p < .01$, one-tailed) more prompt words and recalled significantly ($p < .01$, one-tailed) more CCWs than Group LA.

Another possibility is that LA subjects simply failed to remember some of the prompt words as having occurred in the passage. Evidence for superior recognition of HA items in the presence of distracters was reported by the investigator (1968b). Finally, even if LA subjects recognized the same of prompt words as HA

subjects, if they recalled fewer CCWs, they may have decided to record only those prompt words for which they could supply some additional material from the passage. Unfortunately, it was not possible to evaluate the contribution of these two factors to the results of the present study.

One way to determine whether the groups differed in the recall of CCWs independently of the number of prompt words utilized, would be to look at the proportion of the total number of possible CCWs that were recalled correctly. This measure is determined for each subject on the basis of the particular prompt words utilized. However, since it is difficult to determine which CCWs should be assigned to a given prompt word in passages such as the present ones, it seemed reasonable to look at only those instances in which all four key items from a cluster of HA (e.g., man, woman, boy, girl) or LA (e.g., man, guest, horse, bird) words were utilized. The CCWs for each cluster of four HA and LA items were the words that occurred in the original passage in the sentence or sentences that contained the four key items in question.

As one would anticipate, the mean number of key-word clusters utilized by Group HA (9.26) was greater than the mean for Group LA (5.05). However, the means for the number of possible CCWs for these clusters for the HA (5.87) and LA (5.90) conditions were virtually identical.

The mean proportion of possible CCWs recalled correctly was greater for Group HA (.37) than for Group LA (.28). The difference was found to be highly significant, $t(36) = 2.73$, $p < .005$, one-tailed. Thus, there is some evidence that the associations established during learning between HA items and CCWs may be stronger than the associations established between LA items and CCWs.

Discussion

Although the results of the present study do not eliminate the possibility that the superior recall of CCWs from HA passages is due--at least in part--to the presence of more cues during recall, there was some evidence that HA subjects may have recalled proportionally more CCWs than LA subjects. However, a better test of the hypotheses concerning the source of facilitation in the recall of CCWs would perhaps be one in which all or nearly all key-word prompts are eliminated during retrieval. Thus, if CCWs from HA passages are stored more efficiently than CCWs from LA passages, recognition memory for HA CCWs should be superior to recognition memory for LA CCWs in a retrieval task in which no

key items appear and subjects are prevented as much as possible from thinking about the passage as a whole. A rapidly paced, successive binary recognition task in which CCWs are arranged randomly within a long list of distracters, should be adequate for this purpose (Rosenberg, 1968b).

One of the basic rules followed in the preparation of the passages used in the present study was the key words from each cluster should be semantically related, as far as possible, within the context of the same sentence or adjacent sentences. Under these conditions, unprompted recall of HA CCWs was found to be superior to unprompted recall of LA CCWs. If subsequent research should confirm the finding that HA CCWs are stored more efficiently than LA CCWs, it will be necessary to determine to what extent this is the result of the particular arrangement of context materials and key items. However, because of the difficulties involved in the preparation of connected discourse for experimental purposes, research on this problem might proceed most efficiently at the level of the sentence.

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Footnote

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